

## Toward a gender-oriented scientific communication

Luca De Fiore

Il Pensiero Scientifico Editore and Associazione Alessandro Liberati Network italiano Cochrane

**Summary.** In recent decades, major steps have been made along the path to real equality of rights between male and female researchers in medicine and science. The increase in the number of female doctors has contributed to achieving this result and it is likely that the situation will further improve considering the high number of women enrolled in schools of medicine. However, it is important that the assessment of skills and of clinical and research activities of individual professionals and, therefore, career advancement should be free from gender-related constraints. All the professional figures involved in communication activities related to research should make their own contribution to achieving this objective: overseeing the relationship between the number of female authors and that of male authors of papers accepted for publication; checking the consistency of the position of the signatures of authors in relation to the contribution to the research work and the preparation of articles, as well as on the improper recognition of honorary authorship; ensuring a balanced composition of scientific committees in terms of gender; monitoring the peer review process of contributions received and avoiding any gender bias in the evaluation of articles.

**Key words.** Gender bias, scientific communication.

### *Per una comunicazione scientifica orientata al genere*

**Riassunto.** Negli ultimi decenni, sono stati fatti passi importanti sulla strada di una reale parità di diritti tra ricercatori donne e uomini in ambito medico-scientifico. L'aumento del numero di donne medico ha contribuito a questo risultato ed è probabile che la situazione migliorerà ulteriormente considerato l'elevato numero di donne iscritte alle facoltà di Medicina. È importante, però, che la valutazione delle competenze e dell'attività clinica e di ricerca dei singoli professionisti e, di conseguenza, la progressione delle carriere siano liberi da condizionamenti legati al genere. Tutte le figure professionali coinvolte nell'attività di comunicazione della ricerca dovrebbero dare il proprio apporto per raggiungere questo obiettivo: vigilando sul rapporto tra il numero delle autrici e quello degli autori dei lavori accettati per la pubblicazione; verificando la coerenza della posizione delle firme delle autrici in rapporto al contributo dato al lavoro di ricerca e di preparazione degli articoli, nonché sull'improprio riconoscimento di honorary authorship; garantendo una composizione equilibrata di genere dei comitati scientifici; monitorando il processo di

peer review dei contributi ricevuti ed evitando qualsiasi bias di genere nella valutazione degli articoli.

**Parole chiave.** Bias di genere, comunicazione scientifica.

Gender-oriented medicine is not women's medicine, but the ability to look at health and illness with an attentive eye to gender-specific factors. The scientific community has long been aware of this, but often times someone falls into the trap<sup>1</sup>, perhaps voicing the hope that greater and more overt attention to women can make an objectively imbalanced scenario a little less unfair. What would really be more useful is reasoning on the dynamics that influence relations between genders and on the determinants that give men an edge in academic medicine and in the production and dissemination of research.

As for the positive aspects, it should be noted that the number of women receiving PhDs in U.S. institutions has grown every year from 2005 to 2015<sup>2</sup>. Clearly, this growth is still not satisfactory since the values are between 0.1% and 0.6% a year, but the sciences are unfortunately no exception as regards the general situation of gender inequality: in 2006, women accounted only for one quarter of college teaching staff in the United States and female full professors earned 20% less than their male colleagues<sup>3</sup>. Different pay for the same position is at times more blatant among people with greater seniority<sup>4</sup>. However, the gap is extremely significant even comparing the starting salary of doctors fresh out of college in the United States<sup>5</sup>: approximately USD 167,000 a year for a woman as opposed to USD 200,000 for a man<sup>6</sup>. A recent study has confirmed this disparity: ultimately, a female full professor has a salary equal to that of a male associate professor<sup>7</sup>. And this gap is not justified by any difference in clinical or scientific production<sup>8</sup>.

Despite this disparity, the number of female doctors is rising faster than that of professionals in other fields of science: while in 1960 the number of women attending medical school amounted to 6%, about 50 years later that figure has risen to 49% and 25% of working US doctors<sup>9</sup> were women. Already in 2004, 32% of pro-

fessors in medical schools were women. The trend is growing steadily, to the point that some authors have spoken of a feminised profession and argue that this will have a series of positive repercussions in terms of improved patient-physician relationship, willingness to provide home care and the enhancement of the social dimension of the care<sup>10</sup>. These are great benefits for the health care system, but there is no sign of progress in the privileges legitimately associated with positions that involve great responsibility and powers.

Numerous studies have identified the obstacles that prevent women from having careers with advancements commensurate to their skills and ability. These range from sexist behaviour also in health care settings, through constraints resulting from gender bias, to the tendency of senior teaching staff to give more support to male students<sup>11</sup>. Then, there is the major issue of motherhood, which continues to represent another huge obstacle affecting the career of a female doctor<sup>12</sup>. Some authors have even dared to claim that a woman with children is less productive, resorts more frequently to part time and retires from work early<sup>13</sup>. In addition, they tend to avoid some important medical specializations, such as surgery, thus resulting in short staffing in certain key areas of healthcare. It goes without saying that these are subjective considerations, even where they are supported by weak evidence<sup>14</sup>.

Studies in recent decades have shown that the road ahead toward equality is still very long<sup>15</sup>. One of the key issues is that of the assessment of productivity and overall professional competence of female researchers and physicians, because all too often it is the element that is used to justify disparity in treatment. However, this difference in productivity decreases as the age of female researchers increases, almost confirming that a person who is free from family commitments has a research output that is not affected by gender<sup>16</sup>. In this, the dynamics that underpin scientific communication and medical publishing play a fundamental role. However, is medical publishing really gender-oriented? How can the various players involved in scientific communication – publishers, editors-in-chief of journals, editors, authors – contribute to restoring a situation of gender equality?

### Scientific literature is a male world

A study carried out considering three of the best known international journals in the field of general medicine (*New England Journal of Medicine*, *JAMA* and *Annals of Internal Medicine*) and three of the most important medical speciality journals (*Annals of Surgery*, *Obstetrics & Gynecology*, *Journal of Pediatrics*) has shown a growing presence of women as first and last author, but the per-

centage difference between authors is still very marked: women accounted for 5.9% in 1970 and 29.3% in 2004. A more recent study on the gender of the first author in articles that have appeared on six important general medicine journals (*Annals of Internal Medicine*, *Archives of Internal Medicine*, *BMJ*, *Lancet*, *New England Journal of Medicine* and *JAMA*) has found a similar trend between 1994 (27%) and 2014 (37%). In the last 5 years studied, however, the situation not only has not improved, but it seems that the probability that a woman is among the authors is slightly decreasing<sup>17</sup>. There are marked differences between journals: already several years ago, it was seen that few women are published by the *New England Journal of Medicine* and many more on *BMJ*. This diversity is attributed by the authors to the tendency of the weekly journal of the Massachusetts Medical Society to publish multicenter experimental studies that receive major funding, whose recipients are seldom women.

The analysis of the original articles published as a result of experimental research highlights the existence of inequalities in the distribution of the various tasks within the same research group. Women are most frequently responsible for carrying out routine tasks – e.g., doing basic research experiments – while men are more often involved in the study design or writing the article<sup>18</sup>.

The contribution made by female authors to writing guest editorials<sup>19</sup>, perhaps the most prestigious space in a scientific journal for its authorial relevance, was also modest – below 20%. These findings are also correlated with the low number of women holding key positions in academic medicine. As is often the case, however, it is not clear whether the egg or the chicken came first. Since academic publications are very important to obtain university assignments and for career advancement, the under-representation of women as authors and a position of lesser prestige among the authors of papers negatively affects the presence of women in academia. Clearly, there is no lack of evidence to indicate that there are different determining factors of this reduced visibility. In a field other than medicine – like environmental sciences – women account for 20%, but have written only 3.8% of commissioned articles for *News and Views* on the British journal *Nature*<sup>20</sup>.

Looking at commissioned articles – those that perhaps more than other types of articles contribute to shaping the character of a scientific journal –, it is natural to consider the composition of the advisory boards of academic journals from which the authors are called to comment on the original articles published. They are also the space where contributions indicating a desirable development, an innovative line of research, or emerging research pathways are most often found. The visibility obtained by signing an editorial in a prestigious journal sets in motion a virtuous circle of collaborations in-

tended to further increase an author's standing. Well, even within scientific committees, women are under-represented in the field of life and environmental sciences<sup>21</sup> as well as in general medicine<sup>22</sup> and in certain medical specialties<sup>23</sup>. This finding also emerges from a study on 16 major international journals: less than one out of every four board members was a woman, but the most interesting aspect was the sharp difference between the greater presence of women on boards of British and Canadian journals compared to those of US journals<sup>24</sup>. The data were also confirmed by more recent analyses<sup>25</sup>. The importance of reaching a new balance as soon as possible to reorient editorial and cultural policies of the main scientific journals is self-evident. Obviously, these policies also have a direct influence on the spread and impact of information and their translation into health care practices and strategies for public health.

The composition of an editorial board may affect or even suggest the path to evaluate the articles received by the editorial staff of a journal, either because the members of the board are almost always editors too, or because they are the first who – if necessary – give management the names of colleagues who are experts in the subjects of the studies in the articles to be assessed. Studying the influence of gender in the critical review of scientific literature is however complex because almost all journals do not make public the names of the referees assigned to the evaluation of the articles. Only in recent years have some journals or publishing groups chosen the path of transparency: this has allowed conducting studies that have confirmed that even the peer review is predominantly male and that male editors-in-chief of journals clearly tend to prefer reviewers of the same sex<sup>26</sup>, despite female reviewers are equally available<sup>27</sup>. Once again, women are less frequently selected as reviewers than one would expect given the number of articles submitted or published by female authors. The effects of discrimination are also important because the work of critically reviewing the literature is an essential part of research and cultural comparison, as well as for the possibility of developing relationships and enjoying the privilege of gaining access to research not yet published.

### Changing gear

In a highly competitive environment such as that of scientific research, decision-makers who have a voice in the editorial process have an essential and very delicate role to play, a position that has a direct impact on the professional fate of colleagues, on the commercial success of products, on the economic profit of companies and, of course, on people's health. There are countless real and potential constraints that may be forced upon

editorial decision-makers: from those of a strictly financial nature, related to the possible personal economic benefits, to those related to more general professional dynamics, such as those that may regard the institution of belonging. In this context, however, the constraints that are more or less expressly and consciously linked to gender should also be considered.

Publishing and scientific communication may prove to be respectful of gender equality by translating the many statements of principle that have been too often disregarded into concrete facts. In the first place, by recognising the value of competence irrespective of gender and by paying the cultural work of a woman the same as that of a man. Then, by examining the male-to-female ratio among the authors of published works to identify the reason for any unwarranted disproportion. Particular attention should be placed on the position of the authors, fighting the bad habit of honorary authorship<sup>28</sup>, which in one out of five cases on average gives "teachers" (very often men) the authorship of a work in which they have not collaborated directly. A fair composition of the advisory boards of journals can contribute to gender equality, also for the impact it could have on the assessment of submissions. Finally, particular attention should be paid to peer review because it is balanced and immune to gender bias<sup>29</sup>.

The dissemination of research results is an all too important task to neglect the ethical implications of the work of the professional figures involved: authors, editors-in-chief of journals, referees, members of editorial boards, publishers and editors. A joint commitment is needed also for the purpose of restoring the credibility of a sector like scientific communication, which is characterised by widespread conflicts of interest<sup>30</sup> and examples of bad conduct.

### References

1. Lorenzin B. L'attenzione al genere: una scelta strategica per l'appropriatezza. *It J Gender-Specific Med* 2015;1:41-2.
2. National Science Foundation. National center for science and engineering statistics. Doctorate recipients from US. [www.nsf.gov/statistics/2017/nsf17306/](http://www.nsf.gov/statistics/2017/nsf17306/)
3. West MS, Curtis JW. AAUP faculty gender equity indicators 2006. Technical Report. American Association University Professors.
4. Ash AS, Carr PL, Goldstein R, Friedman RH. Compensation and advancement of women in academic medicine: is there equity? *Ann Intern Med* 2004; 141: 205-12.
5. Lo Sasso AT, Richards MR, Chou CF, Gerber SE. The \$16,819 pay gap for newly trained physicians: the unexplained trend of men earning more than women. *Health Aff* 2011; 30: 193-201.
6. Jagsi R, Griffith KA, Stewart A, Sambuco D, DeCastro R, Ubel PA. Gender differences in the salaries of physician researchers. *Jama* 2012; 307: 2410-7.

7. Jena AB, Olenski AR, Blumenthal DM. Sex differences in physician salary in US public medical schools. *JAMA Intern Med* 2016; 176: 1294-304.
8. Reed DA, Enders F, Lindor R, McClees M, Lindor KD. Gender differences in academic productivity and leadership appointments of physicians throughout academic careers. *Academic medicine* 2011; 86: 43-7.
9. Women in US academic medicine: statistics and medical school benchmarking 2004-2005. Washington, DC: Association American Medical Colleges.
10. Levinson W, Lurie N. When most doctors are women: what lies ahead? *Ann Intern Med* 2004; 141: 471-4.
11. Yedidia MJ, Bickel J. Why aren't there more women leaders in academic medicine? The views of clinical department chairs. *Academic Medicine* 2001; 76: 453-65.
12. Carr PL, Ash AS, Friedman RH, et al. Relation of family responsibilities and gender to the productivity and career satisfaction of medical faculty. *An Intern Med* 1998; 129: 532-8.
13. McKinstry B. Are there too many female medical graduates? Yes. *BMJ* 2008; 336: 748.
14. Jolly S, Griffith KA, DeCastro R, Stewart A, Ubel P, Jagsi R. Gender differences in time spent on parenting and domestic responsibilities by high-achieving young physician-researchers. *Ann Intern Med* 2014; 160: 344-53.
15. Rochon PA, Davidoff F, Levinson W. Women in academic medicine leadership: has anything changed in 25 years?. *Academic Medicine* 2016; 91: 1053-6.
16. Pan L, Kalinaki E. Mapping gender in the German research arena. Elsevier Analytical Services, 2015.
17. Filardo G, da Graca B, Sass DM, et al. Trends and comparison of female first authorship in high impact medical journals: observational study (1994-2014). *BMJ* 2016; 352: i847.
18. Macaluso B, Larivière V, Sugimoto T, Sugimoto CR. Is science built on the shoulders of women? A study of gender differences in contributorship. *Academic Medicine* 2016; 91: 1136-42.
19. Jagsi R, Guancial EA, Worobey CC, et al. The "gender gap" in authorship of academic medical literature: a 35-year perspective. *New Engl J Med* 2006; 355: 281-7.
20. West JD, Jacquet J, King MM, et al. The role of gender in scholarly authorship. *PloS One* 2013; 8: e66212.
21. Cho AH, Johnson SA, Schuman CE, et al. Women are underrepresented on the editorial boards of journals in environmental biology and natural resource management. *PeerJ* 2014; 2: e542.
22. Keiser J, Utzinger J, Singer BH. Gender composition of editorial boards of general medical journals. *Lancet* 2003; 362: 1336.
23. Galley HF, Colvin LA. Next on the agenda: gender. *Br J Anesthesia* 2013; 112: 139-42.
24. Jagsi R, Tarbell NJ, Henault LE, Chang Y, Hylek EM. The representation of women on the editorial boards of major medical journals: a 35-year perspective. *Arch Intern Med* 2008; 168: 544-8.
25. Amrein K, Langmann A, Fahrleitner-Pammer A, et al. Women underrepresented on editorial boards of 60 major medical journals. *Gender medicine* 2011; 8: 378-87.
26. Helmer M, Schottdorf M, Neef A, Battaglia D. Gender bias in scholarly peer review. *Elife* 2017; 6.
27. Lerback J, Hanson B. Journals invite too few women to referee. *Nature* 2017; 541: 455-7.
28. Wislar JS, Flanagan A, Fontanarosa PB, DeAngelis CD. Honorary and ghost authorship in high impact biomedical journals: a cross sectional survey. *BMJ* 2011; 343: d6128.
29. Gilbert JR, Williams ES, Lundberg GD. Is there gender bias in JAMA's peer review process? *Jama* 1994; 272: 139-42.
30. Fontanarosa P, Bauchner H. Conflict of interest and medical journals. *Jama* 2017; 317: 1768-71.

---

Correspondence to:

Luca De Fiore

email luca.defiore@pensiero.it